

IN THE CLAIMS:

Please amend claims 1 and 21 as follows:

1. (Currently Amended) A fabricating method of a semiconductor integrated circuit device comprising forming a bottom electrode of a capacitor with high-k material on a semiconductor substrate by a chemical vapor deposition method in a sub-atmospheric pressure using an organoruthenium compound as a precursor, which includes steps of:
 - (a) providing the semiconductor substrate in a deposition chamber;
 - (b) after the step (a), increasing a temperature of the semiconductor substrate in the chamber up to a desired temperature without supplying any oxidation gas to the deposition chamber;
 - (c) after the step (b), separately supplying the precursor and an oxidation gas into the deposition chamber to form a ruthenium film for the bottom electrode with a desired thickness on the heated semiconductor substrate, said oxidation gas being separately supplied to said deposition chamber by a supplying system different from a precursor supplying system and only during when the precursor is being supplied; [[and]]
 - (d) after the step (c), stopping the supply of the precursor and said oxidation gas; and
 - (e) after the step (d), decreasing the temperature of the semiconductor substrate without supplying any oxidation gas to the deposition chamber,
wherein said bottom electrode essentially consists of ruthenium.
2. (Cancelled)
3. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 1, wherein the ruthenium electrode forming method further includes a step of introducing a balance gas in addition to a carrier gas so as to keep a pressure in the deposition chamber constant through all of the other steps.
4. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 1, during the supplying step, the oxidation gas and an inert gas are supplied such that a oxygen partial pressure created by the oxidation gas in the

deposition chamber is 0.1 Torr or less such that an amount of oxygen adsorption onto a surface of the semiconductor substrate is set to a minimum amount required for decomposing the precursor.

5. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 1, during the supplying step, the oxidation gas, an inert gas, and a solvent gas are supplied such that the oxygen partial pressure in the deposition chamber is 0.5 Torr or less such that the amount of oxygen adsorption onto the surface of the semiconductor substrate is set to a minimum amount required for decomposing the precursor.

6. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 1, during the supplying step, the precursor of an organoruthenium compound is dissolved in a solvent as the precursor, and

wherein the ruthenium electrode forming method further includes a step of supplying the oxidation gas and an inert gas such that the oxygen partial pressure in the deposition chamber is 0.1 Torr or less thereby setting the amount of oxygen adsorption onto the surface of the semiconductor substrate to a minimum amount required for the decomposition of the precursor thereby increasing the amount of oxygen adsorption onto the surface of the semiconductor substrate and shortening a growth time of the electrode.

7. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 1, during the supplying step, a diluted precursor of an organoruthenium compound is dissolved in a solvent as the precursor, and

wherein the ruthenium electrode forming method further includes a step of supplying the oxidation gas, an inert gas, and a solvent gas such that the oxygen partial pressure in the deposition chamber is 0.5 Torr or less thereby setting the amount of oxygen adsorption onto the surface of the semiconductor substrate to a minimum amount required for the decomposition of the precursor thereby increasing the amount of oxygen adsorption onto the surface of the semiconductor substrate and shortening a growth time of the electrode.

8. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 1, the supplying step further comprising a step of controlling the amount of oxygen adsorption onto the surface of the semiconductor substrate by the amount of a supplied vaporized solvent gas.
9. (Cancelled)
10. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 1, wherein the organoruthenium compound comprises at least one of
bis-(cyclopentadienyl)ruthenium $[\text{Ru}(\text{C}_5\text{H}_5)_2]$,
bis-(methylcyclopentadienyl)ruthenium $[\text{Ru}(\text{CH}_3\text{C}_5\text{H}_4)_2]$,
bis-(ethylcyclopentadienyl)ruthenium $[\text{Ru}(\text{C}_2\text{H}_5\text{C}_5\text{H}_4)_2]$,
tris-(dipivaloylmethanate)ruthenium $[\text{Ru}(\text{C}_{11}\text{H}_{19}\text{O}_2)_3]$, and $\text{Ru}(\text{OD})_3$.
11. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 1, wherein the solvent for dissolving the organoruthenium compound to comprises at least one of methanol, ethanol, 1-propanol, 2-propanol, isobutyl alcohol, 1-butanol, 2-butanol, diethyl ether, diisopropyl ether, octane, tetrahydropuran, tetrahydropyran, 1,4-dioxane, acetone, methyl ethyl ketone, and toluene.
12. (Previously Presented) A fabricating method of a semiconductor integrated circuit device according to claim 1, further comprising:
after forming the bottom electrode, immediately performing annealing at not less than a formation temperature of the bottom electrode made of ruthenium in a reducing atmosphere containing hydrogen thereby removing oxygen introduced into a surface of said ruthenium metal film when said ruthenium metal film is formed therefrom and inhibiting deformation of crystal grains of the bottom electrode of ruthenium in the annealing step during or after forming a high-k capacitor insulator.
13. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 12, wherein the annealing temperature in the reducing

atmosphere is not more than the annealing temperature for crystallization of the capacitor insulator.

14. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 12, wherein the temperature at which the deformation of crystal grains of the bottom electrode of ruthenium is inhibited is 800 °C or less.
15. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 12, wherein a grain size of the crystal grains of the bottom electrode of ruthenium ranges from 30 nm to 60 nm.
16. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 1, wherein the bottom electrode of ruthenium of a capacitor with high-k material is formed on the semiconductor substrate, and immediately thereafter annealing is performed at not less than the formation temperature of the bottom electrode of ruthenium in an inert atmosphere or a reducing atmosphere thereby inhibiting deformation of crystal grains of the bottom electrode of ruthenium in the annealing step during or after capacitor insulator formation.
17. (Cancelled)
18. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 1, wherein the oxidation gas comprises at least one of O₂, N₂O, H₂O, NO₂, and O₃.
19. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 4, wherein the inert gas comprises at least one of N₂, He, Ar, Ne, and Xe.
20. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 12, whereby the annealing step is performed at a temperature lower than a crystallization temperature of the high-k capacitor.

21. (Currently Amended) A fabricating method of a semiconductor integrated circuit device comprising forming a top electrode of a capacitor with high-k material on a semiconductor substrate by a chemical vapor deposition method in a sub-atmospheric pressure using an organoruthenium compound as a precursor, which includes steps of:
- (a) providing the semiconductor substrate in a deposition chamber;
 - (b) after the step (a), increasing a temperature of the semiconductor substrate in the chamber up to a desired temperature with supplying an oxidation gas to the deposition chamber;
 - (c) after the step (b), separately supplying the precursor and [[an]] said oxidation gas into the deposition chamber to form a ruthenium film for the top electrode with a desired thickness on the heated semiconductor substrate, said oxidation gas being separately supplied to said deposition chamber by a supplying system different from a precursor supplying system; [[and]]
 - (d) after the step (c), stopping the supply of the precursor and said oxidation gas; and
 - (e) after the step (d), decreasing the temperature of the semiconductor substrate with supplying an oxidation gas to the deposition chamber,
wherein said top electrode essentially consists of ruthenium, and
said oxidation gas is supplied to said deposition chamber when the substrate temperature is increased, when the precursor is supplied, and when the substrate temperature is decreased.
22. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 21, wherein the ruthenium electrode forming method further includes a step of introducing a balance gas in addition to a carrier gas so as to keep a pressure in the deposition chamber constant through all of the other steps.
23. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 21, during the supplying step, the oxidation gas and an inert gas are supplied such that a oxygen partial pressure created by the oxidation gas in the deposition chamber is 0.1 Torr or less such that an amount of oxygen adsorption onto a surface of the semiconductor substrate is set to a minimum amount required for decomposing the precursor.

24. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 21, during the supplying step, the oxidation gas, an inert gas, and a solvent gas are supplied such that the oxygen partial pressure in the deposition chamber is 0.5 Torr or less such that the amount of oxygen adsorption onto the surface of the semiconductor substrate is set to a minimum amount required for de-composing the precursor.
25. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 21, during the supplying step, the precursor of an organoruthenium compound is dissolved in a solvent as the precursor, and
wherein the top electrode forming method further includes a step of supplying the oxidation gas and an inert gas such that the oxygen partial pressure in the deposition chamber is 0.1 Torr or less thereby setting the amount of oxygen adsorption onto the surface of the semiconductor substrate to a minimum amount required for the decomposition of the precursor thereby increasing the amount of oxygen adsorption onto the surface of the semiconductor substrate and shortening a growth time of the electrode.
26. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 21, during the supplying step, a diluted precursor of an organoruthenium compound is dissolved in a solvent as the precursor, and
wherein the top electrode forming method further includes a step of supplying the oxidation gas, an inert gas, and a solvent gas such that the oxygen partial pressure in the deposition chamber is 0.5 Torr or less thereby setting the amount of oxygen adsorption onto the surface of the semiconductor substrate to a minimum amount required for the decomposition of the precursor thereby increasing the amount of oxygen adsorption onto the surface of the semiconductor substrate and shortening a growth time of the electrode.
27. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 21, during increasing the substrate temperature, oxygen partial pressure in the deposition chamber is 0.5 Torr or less.

28. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 21, the supplying step further comprising a step of controlling the amount of oxygen adsorption onto the surface of the semiconductor substrate by the amount of a supplied vaporized solvent gas.
29. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 21, wherein the organoruthenium compound comprises at least one of
- bis-(cyclopentadienyl)ruthenium $[\text{Ru}(\text{C}_5\text{H}_5)_2]$,
 - bis-(methylcyclopentadienyl)ruthenium $[\text{Ru}(\text{CH}_3\text{C}_5\text{H}_4)_2]$,
 - bis-(ethylcyclopentadienyl)ruthenium $[\text{Ru}(\text{C}_2\text{H}_5\text{C}_5\text{H}_4)_2]$,
 - tris-(dipivaloylmethanate)ruthenium $[\text{Ru}(\text{C}_{11}\text{H}_{19}\text{O}_2)_3]$, and $\text{Ru}(\text{OD})_3$.
30. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 21, wherein the solvent for dissolving the organoruthenium compound to comprises at least one of methanol, ethanol, 1-propanol, 2-propanol, isobutyl alcohol, 1-butanol, 2-butanol, diethyl ether, diisopropyl ether, octane, tetrahydropuran, tetrahydropyran, 1,4-dioxane, acetone, methyl ethyl ketone, and toluene.
31. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 21, wherein the oxidation gas comprises at least one of O_2 , N_2O , H_2O , NO_2 , and O_3 .
32. (Previously Presented) The fabricating method of a semiconductor integrated circuit device according to claim 23, wherein the inert gas comprises at least one of N_2 , He, Ar, Ne, and Xe.